

# PANDORA'S FOX?

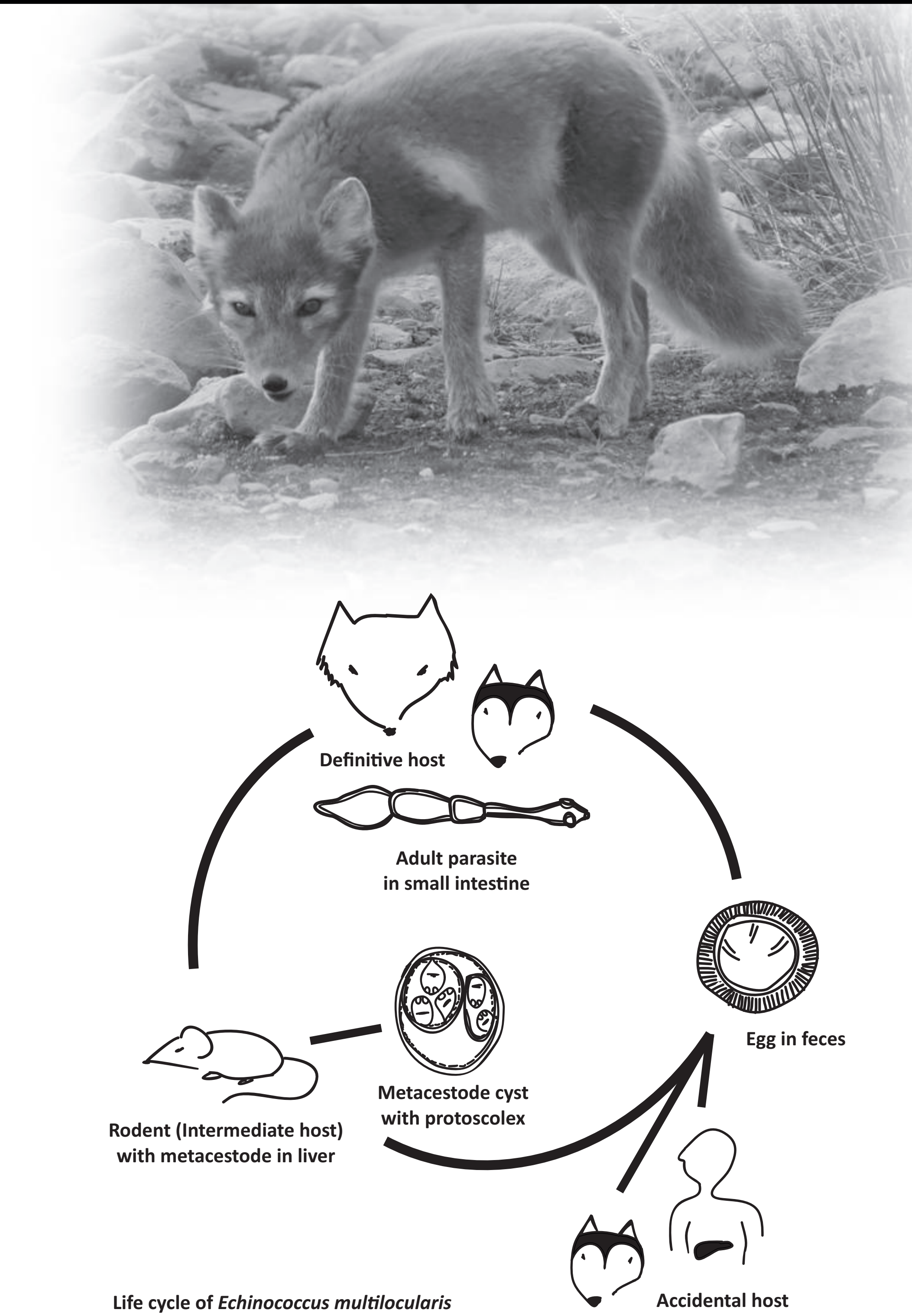
## OVERVIEW OF ZOONOTIC AGENTS CARRIED BY ARCTIC FOXES

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Intestinal parasites are not usually perceived as the most evil creatures on the planet although exceptions exist. Certainly, they do not make our lives easier if contracted as an infection nor they help with efforts in the wildlife conservation programs and especially when it comes to parasites transmitted between human and the wildlife. Arctic fox (*Vulpes lagopus*), one of the major predators in the Arctic, is a potential source of intestinal parasites that could endanger people and dogs alike. Most common inhabitants of its intestinal tract are *Toxascaris leonina*, *Trichuris vulpis* and *Eucoleus aerophilus* and all three of them have a zoonotic potential. In addition, the list of parasites inhabiting foxes entrails that could be harmful not only to them is still incomplete. Furthermore, the matter is aggravated by dogs living in close proximity to humans that can cause a spread of diseases and increase the chance of transmission.



|                                     | Iceland <sup>1</sup> | Greenland <sup>2</sup> | Svalbard <sup>3</sup> | Canada <sup>4</sup> | Sweden/<br>Norway <sup>5</sup> |
|-------------------------------------|----------------------|------------------------|-----------------------|---------------------|--------------------------------|
| <b>Protista</b>                     |                      |                        |                       |                     |                                |
| <i>Encephalitozoon cuniculi</i>     | ●                    |                        |                       |                     |                                |
| <i>Enterocytozoon bienersi</i> *    | ●                    | ●                      | ●                     |                     |                                |
| <i>Toxoplasma gondii</i>            |                      |                        | ●                     |                     | --/●                           |
| <i>Cryptosporidium canis</i> *      |                      | ●                      |                       | ●                   | ●                              |
| <i>Balantidium</i> sp.              |                      |                        |                       |                     | ●                              |
| <i>Giardia</i> sp.                  |                      |                        |                       | ●                   |                                |
| <i>Sarcocystis</i> spp.             |                      |                        |                       | ●                   | ●/●                            |
| <b>Nematoda</b>                     |                      |                        |                       |                     |                                |
| <i>Eucoleus aerophilus</i>          | ●                    |                        | ●                     | ●                   | ●                              |
| <i>Strongyloides stercoralis</i>    |                      | ●                      |                       |                     |                                |
| <i>Toxocara canis</i> *             | ●                    |                        | ●                     |                     | ●                              |
| <i>Toxascaris leonina</i> *         | ●                    | ●                      | ●                     | ●                   | ●                              |
| <i>Trichinella nativa</i>           |                      | ●                      | ●                     | ●                   |                                |
| <i>Trichuris vulpis</i>             |                      |                        | ●                     |                     | ●                              |
| <i>Uncinaria stenocephala</i>       | ●                    | ●                      | ●                     |                     | ●                              |
| <i>Crenosoma vulpis</i>             |                      |                        |                       |                     | ●                              |
| <b>Cestoda</b>                      |                      |                        |                       |                     |                                |
| <i>Echinococcus multilocularis</i>  |                      | ●                      | ●                     | ●                   |                                |
| <i>Diphyllobothrium dendriticum</i> | ●                    | ●                      |                       |                     |                                |
| <i>Mesocestoides lineatus</i>       |                      | ●                      |                       |                     |                                |
| <i>Schistocephalus solidus</i>      | ●                    |                        |                       |                     |                                |
| <i>Taenia crassiceps</i>            |                      |                        | ●                     | ●                   |                                |
| <b>Trematoda</b>                    |                      |                        |                       |                     |                                |
| <i>Brachylaemus</i> sp.             | ●                    |                        |                       |                     |                                |
| <i>Cryptocotyle lingua</i>          | ●                    | ●                      |                       |                     |                                |
| <i>Plagiorchis elegans</i>          | ●                    | ●                      |                       |                     |                                |
| <i>Spelotrema</i> sp.               | ●                    |                        |                       |                     |                                |

Tab. List of fox parasites with zoonotic potential; ● was recorded, ● was recorded+our records, ● our new records, \*also molecular data

<sup>1</sup> Hersteinsson, P. et al. Prevalence of *Encephalitozoon cuniculi* antibodies in terrestrial mammals in Iceland, 1986 to 1989. J. Wildl. Dis. 29, 341–344 (1993).  
<sup>2</sup> Skirnisson, K. et al. Parasites of the arctic fox (*Alopex lagopus*) in Iceland. J. Wildl. Dis. 29, 440–446 (1993).  
<sup>3</sup> Andreassen, P. N. S. et al. Gastrointestinal parasites of two populations of Arctic foxes (*Vulpes lagopus*) from north-east Greenland. Polar Res. 36, (2017).  
<sup>4</sup> Kapel, C. M. O. & Nansen, P. Gastrointestinal helminths of arctic foxes (*Alopex lagopus*) from different bioclimatological regions in Greenland. J. Parasitol. 82, 17–24 (1996).  
<sup>5</sup> Akerstedt, J. et al. Serosurvey for canine distemper virus, canine adenovirus, *Leptospira interrogans*, and *Toxoplasma gondii* in free-ranging canids in Scandinavia and Svalbard. J. Wildl. Dis. 46, 474–480 (2010).  
Henttonen, H. et al. *Echinococcus multilocularis* on Svalbard: introduction of an intermediate host has enabled the local life-cycle. Parasitology 123, 547–552 (2001).  
Prestrud, P. et al. The prevalence of *Trichinella* sp. in Arctic foxes (*Alopex lagopus*) in Svalbard. J. Wildl. Dis. 29, 337–340 (1993).  
Prestrud, K. W. et al. Serosurvey for *Toxoplasma gondii* in arctic foxes and possible sources of infection in the high Arctic of Svalbard. Vet. Parasitol. 150, 6–12 (2007).  
Stien, A. et al. Intestinal parasites of the Arctic fox in relation to the abundance and distribution of intermediate hosts. Parasitology 137, 149–157 (2010).  
<sup>4</sup> Eaton, P. Some Intestinal Parasites of Arctic Fox, Banks Island, N. 43, 229–230 (1979).  
Elmore, S. A. et al. Endoparasites in the feces of arctic foxes in a terrestrial ecosystem in Canada. Int. J. Parasitol. Parasites Wildl. 2, 90–96 (2013).  
<sup>5</sup> Aguirred, et al. Health Evaluation of Arctic Fox ( *Alopex Lagopus* ) Cubs in Sweden Health Evaluation of Arctic Fox ( *Alopex Lagopus* ). J. Zoo Wildl. Med. 31, 36–40 (2000).  
Meijer, T. et al. Endoparasites in the endangered Fennoscandian population of arctic foxes (*Vulpes lagopus*). Eur. J. Wildl. Res. 57, 923–927 (2011).

### Acknowledgement



The polar ecology course is organized with support from project "Vytvoření pracovního týmu a pedagogických podmínek pro výuku a vzdělávání v oblasti polární ekologie a života v extrémním prostředí", reg. č. CZ.1.07/2.2.00/28.0190. Project is funded by the European social fund and from the government budget of the Czech Republic. (Establishing of working team and conditions for education in the field of polar ecology and life in extreme environments)

